From Science to Architecture
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Introduction:
My thesis began with an interest in finding various differences and commonalities in the fields of science and architecture. I have always been interested by the seemingly fast paced progression of science and technology in comparison to other creative fields. There appears to be a constant stream of discoveries and new technologies. And so I wondered if there was anything about the way the scientist works that the architect could learn. I began by reading books about “the role of the scientist”, and books written by scientists. I have also tried to explore a lasting interest in energy and the cycle of energy on the planet and will hopefully look at new types of cyclical energy consumption as opposed to the more linear energy consumption that we have operated for years as one of the new proposed answers to climate change in my design project. My writing has become a background as to how I may approach this. I think now is the time that architects must seriously try and remove themselves from the romanticism that can sometimes cloud the vision of the architect and consider the serious impact that they have on the planet.

Hypothesis:
The way we as architects have been working up until now has tended towards the representational and is usually heavily influenced by what has come before. This can change through influences from different fields.
The Journey of Science

When we think of science and the journey it has taken, there are a few names that stand out to all; Galileo, Newton, Darwin, Einstein, Schrodinger. The same can also be said for architecture with names like Frank Lyod Wright, Corbusier, Mies Van der Rohe, Gropius, Gehry. When we apply these names to a timeline we can see that the names of the scientists are spread far more evenly through the centuries than those of the architects. The architects listed have primarily operated in the 20th century. These architects (with the exception of gehry) were all involved in the modernist movement. The modernist movement in architecture began towards the end of the 19th century and lasted until the middle of the 20th century. Although this movement finished sixty years ago, the architects and their works are still being discussed. It is referred to far more often than the postmodern movement and architects that followed, and it’s simple celebration of form is still influencing architects like David Chipperfield and Steven Holl. Sixty years ago in science Watson and Crick discovered the double helix structure of DNA. Today in microbiology miniature human brains have been grown in labs as a result of stem cell research. The field of architecture needs a new modernist movement. A movement that focuses on a more radical solution to environmental change and sustainable building methods.

Freeman Dyson discusses the the way in which scientists from the early twentieth century worked, scientists like Einstein, Bohr and Rutherford. He describes how their only goal was to better understand the world and how it worked, to “catch a glimpse of the transcendent beauty of nature”. How new ideas did not belong to any one culture and how the people operating in the field of science all shared a ubiquitous quest for new knowledge as a way of rebelling against an ideological society. Dyson provides an extract from a lecture given by the biologist J.B.S Haldane in 1923:

“We must regard science then from three points of view. First it is the free activity of man’s divine faculties of reason and imagination. Secondly, it is the answer of the few to the demands of the many for wealth, comfort and victory, gifts which it will grant only in exchange for peace, security, and stagnation. Finally, it is man’s gradual conquest, first of space and time, then of matter as such, then of his body and those of other living beings, and finally, the subjugation of the dark and evil elements in his own soul.”

A goal shared by several scientists at the time, that would truly prove their knowledge of the universe, was the idea of the grand unifying theory. It was also known as reductionism and was attempted by many across several different fields. It was pursued by some of the most famous scientists in history including Einstein. Einstein came up with his theory of general relativity at the age of twenty six and according to Haldane did his best work up until the age of forty. It was after this that he began his search for “a set of equations that would unify the whole of physics”. At the height of his reputation within the scientific community he passionately pursued after his unified field theory, which like so many others was doomed to failure. Despite his failure in later life, Einstein is still one of the most highly regarded scientists of his field. For most it his relativity theory that really impresses, but more than that it is his, and so many other scientists of the time, passionate pursuit and belief in the new, and seeming indifference to failure that is truly inspiring.

Unfortunately, in recent times this pursuit has been fueled more by economics than by passion. Dyson talks about how in recent times science has entered a grey ethical area, that science during Einstein’s time and even generations before produced the kinds of scientific advancements that benefitted society as a whole. Advancements like the electric light, the telephone, the refrigerator, antibiotics and vitamins acted more as social equalisers than technologies today which can sometimes widen the social classes. “The failure of science to produce benefits for the poor in recent decades is due to two factors working in combination: the pure scientists have become more detached from the mundane needs of humanity, and the applied scientists have become more attached to immediate profitability.” The questions Dyson asks of the field of science can also be asked of the field of architecture. Architecture as the great equaliser with the possibility to address problems that affect all parts of society, like dealing with climate change, but address these problems with the same passion and unafraid manner in pursuing something entirely new as Einstein and his counterparts.

“We cannot solve our problems with the same thinking we used when we created them” - Albert Einstein

Modes of Working: Architects

A small cell-like structure spreads across the landscape, beginning from one central circle, the nucleus. From the nucleus the structure grows like a living organism, repeating cells and spreading its surface area to grow on new ground. Each cell has a relation to the cell beside it, one working off the other. With no coherent overall shape the organism can only be defined by its ability to multiply within its cellular system. Each cell contains its own life, providing its own function that becomes part of the function of the overall system, like red and white blood cells intermingling and held together by plasma. Some cells work harder than others, internally they become subdivided again with a different efficient cellular system. The organism is connected to a main artery at one point that continues to flow along one side.

Above is a description of a drawing by the architect Jean Renaudie. The drawing is of a project proposed by Renaudie for a new town in France. He worked through the project as most architects of the time, and even now, did through drawing and redrawing. Although Renaudie maintained that the drawings were abstract they are still of value as they illustrate a scientific way of thinking combined with an architectural way of working. The drawings were done in the late 1960s in his office by him and Nina Schuch, a draftswoman. Watson and Crick published their findings on the structure of DNA in 1953, which was a celebrated milestone in the field of microbiology and widely discussed as well as advancements in vaccinations. And so when Renaudie was imagining and drawing Le Vaudreil he drew it as if it were a living organism, a disease that spread over the cliffs he planned to build on. His colleagues in the office did not share his vision. “His drawings of assemblages, of cellular tissues, of proliferations, of a town envisaged as a living biological mass were to them so much phantasmagoria.” They struggled to understand the drawings and as a result the theory behind them. While he was very passionate about his drawings and spent time in producing many, he never pushed them past that all-to-comfortable abstract stage. “Renaudie could make several large drawings in a day using the felt-tips which became a mark of modernity in the mid-1960s, and they could look almost the same.” If Einstein’s unified field theory failed because his vision was to wide, then Renaudie’s theory failed not because it was too narrow but because it appeared so. There appears to be a constant struggle between the theory and drawings/models of architects. I think it is about choosing the right method to represent a theory.

Architects when creating something usually work through the same process and are often heavily influenced by the work of other architects. Most begin the design process through sketching and making some sketch models. This quickly gives way to more finalised construction drawings, renders and models. Only at the very end of the process, once the building is actually built, do you get something that is created purely for itself and not just created to represent something else. And so for most of the process the architect spends time creating representations of an idea, which more often than not, are created minus the performative aspects of the physical building. The initial sketches are usually rough and created with pen or pencil. They are mostly used to create an overall shape and tease out certain design details. Once this is done the drawing is taken over by a team of draftspersons who create models and draw up the correct construction drawings.

On the next page is an image of a sketch done by Frank Gehry. It is an early concept drawing of his Dancing House built in Prague. His sketches are usually done with an inky pen on watercolour paper, or a marker on canvas like in the following page. He likes to work in a free hand style that generates a more free form style of architecture. He uses the traditional method of drawing to create a more contemporary personal architecture.

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Below is a photograph of Le Corbusier sketching with charcoal on a large sheet of paper during a presentation. Below it is an image of the draftspeople in his office in Paris, 1935. Most of the people working in the photo would have been apprentices. Corbusier himself apprenticed for Auguste Perret and Peter Behrens from 1908 to 1911.
Below is a picture of Louis Kahn working on a site model in his office of Sher-e-Bangla Nagar in Bangladesh. This illustrates the common occurrence where a team within an office will gather around a site model to discuss a project. The site model is one of the most important tools in the design process. A lot of decisions can be made regarding the buildings relationship to context and even the design of the building itself.
Modes of Working: Scientists

Looking at the way in which architects work I have tried to compare it to the way scientists work. According to Catherine Adley, a microbiologist at the University of Limerick, most scientists work by what is known as the scientific method. This method involves first formulating a question eg. Why does ‘x’ happen? This question then helps to generate a hypothesis, which is a statement the scientist wants to prove. For example in 1928 Frederick Griffith wanted to prove that DNA was the transformative material within a bacteria sample. Usually thorough research is undertaken to see if there have been any previous findings or failures on the chosen area. Then various approaches to proving the hypothesis are looked at, where different types of software simulations are created to try and help generate a lab method. Once a method is chosen tests are run in a lab to try and achieve a result that will help prove the hypothesis. The data created from the testing is then analysed and some experiments are repeated to further strengthen the data. The results are then discussed and the validity of the hypothesis is decided.1

While this method of working is very interesting sometime it is more interesting to look at those scientists who created their own method. In the 1950s and 60s in particular there was an interesting crossover between how scientists worked and how architects worked. Scientists became interested in making physical models. It required a certain amount of imagination and three dimensional visualisation skills, not unlike those required of an architect. In particular microbiologists began to model the structure of proteins and viruses. Possibly one of the most well known type of model used in science is the ball and stick model. It is often used in science classes with students to show the structure of certain compounds.

The first of the famous ball and stick models was created by August Wilhelm von Hofmann in 1865. According to Norman L. Allinger von Hofmann created his very first model using a croquet set, with holes drilled into the croquet balls and using the croquet handles as the sticks.2 The ball and stick model has now become synonymous with atomic structure. Model building in science really came into it’s own in the 1950’s. James Watson and Francis Crick created their model of DNA in 1953 from various bits and pieces around the lab. They were hoping to discover the three dimensional structure of DNA through creating a physical model. They used information and two dimensional images from the crystallographer Rosalind Franklin to develop the different relationships they thought existed between the atoms. The two scientists speculated about the helical structure of DNA and so tried to create a model that could prove this. In 1951 Linus Pauling had proposed the alpha helix structure of proteins in a lecture attended by Watson. He saw Pauling’s achievement as a “product of common sense, not the result of complicated mathematical reasoning”. The complicated mathematics on pencil and paper had been replaced with Linus sitting down with a set of molecular models and applying a logical reasoning of what atoms liked to sit next to each other. Watson believed that the structure for DNA could be solved in much the same way.3

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1 Catherine Adley, Senior lecturer of Microbiology at the University of Limerick.
2 Norman L. Allinger, Molecular Structure: Understanding Steric and Electronic Effects from Molecular Mechanics (New York: John Wiley and sons, 2010), 2
In James Watson’s book The Double Helix he describes the “not joyous” task of assembling the DNA model, “Even though only about fifteen atoms were involved, they kept falling out of the awkward paincers set up to hold them the correct distance from one another. Even worse, the uncomfortable impression arose that there were no obvious restrictions on the bond angles between several of the most important atoms. This was not at all nice.”  

This method was not only a mode of representation for the scientists but also a way of working that allowed them to break free from the rigid reasoning of mathematics and the images from crystallographers. In this way there was a freedom of thought and expression which was not possible in any other way in science. They could easily work through different variations of atomic structure through the model using their intuition of chemical structure. Eventually the method began working for Watson and Crick too. “After tea, however, a shape began to emerge which brought back our spirits. Three chains twisted about each other in a way that gave rise to a crystallographic repeat every 28Å along the helical axis. This was the feature demanded by Maurice’s and Rosy’s pictures, so Francis was visibly reassured as he stepped back from the lab bench and surveyed the afternoon’s effort. Admittedly a few of the atomic contacts were still too close for comfort, but, after all, the fiddling had just begin. With a few hour’s more work, a presentable model should be on display.”

The process of the building the model for Watson and Crick was a way of working through various speculations and proving that some of those speculations could actually work in a three dimensional structure. The model became the rough workings and the final piece all in one.

Another scientist who used modeling as a means of discovery was James Bernal who worked through models to try and solve the structure of liquids. In the book by Andrew Brown he describes how Bernal's choice to work through physical model was heavily influenced by Crick and Watson's model of DNA a few years previous.

"Spokes of the model were cut to different lengths that represented interatomic distances found in liquids, in accordance with the radial distribution function - each length of spoke was made a different colour. The model had to be free of any long-range order or pattern."  

Unlike Watson and Crick who were following a specific pattern from crystallographic images and were deliberately trying to generate a pattern, Bernal created an even larger freedom for himself without the reliance of pattern making and used the process of model making to its full potential. He describes his way of working "I tried to do this in the first place as casually as possible, working in my own office, being interrupted every five minutes or so and not remembering what I had done before the interruption." In this way the model was informing him as much as he was informing the model. Through his irregular creation of the model he noticed some more defined shapes. "Although there was by design no regularity in the model, on inspection he could find a variety of irregular shapes such as semi-octahedra and tetrahedra." This experiment went on to inform another experiment where soft plastecine balls were placed in a balloon. All the air was then vacuumed out of the ball so that the only space taken up inside the balloon was the plastecine balls squashed together. The squashing together of the plastecine created "very beautiful and shapely polyhedra". After this experiment followed another one using beeswax instead of plastecine. Bernals used modelling in a more experimental way to Watson and Crick, he wasn't looking for one particular result and so achieved more.

1 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442  
2 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442  
3 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442
The structure of viruses in the late 1950’s was also a hot topic among microbiologists. Rosalind Franklin who had helped Watson and Crick discover the double helix, was also using crystallography to try and discover the structure of the polio virus. Franklin died in 1958 at the age of thirty-seven her work on the virus very much unfinished. Aaron Klug took it upon himself to finish the work and was able to get the highest detailed images using a anode x-ray tube. From these images, in June 1959, Klug published that "the polio virus is constructed with icosahedral symmetry." Someone else who was working on icosahedron structures in a very different way was the architect Buckminster Fuller. His work on these structures caught the interest of Klug who read his biography and proceeded to write a letter to Fuller describing the similarities between the icosahedral structure of viruses and his geodesic domes. On a subsequent visit to London Fuller visited Klug in Birkbeck university where they had a long conversation, following which Klug and a colleague published a paper stating:

“The solution we have found was, in fact, inspired by the geometrical principles applied by Buckminster Fuller in the construction of geodesic domes. The resemblance of the designs of geodesic domes to icosahedral viruses has attracted our attention at the time of the poliomyelitis work. Fuller has pioneered in the development of a physically orientated geometry based on the principles of efficient design. Considering the structure of the virus shells in terms of these principles, we have found that with plausible assumptions on the degree of quasi-equivalence required, there is only one general way in which iso-dimensional shells may be constructed from a large number of identical protein sub-units, and this necessarily leads to icosahedral symmetry.”

1 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442
2 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442
3 Andrew Brown, J.D Bernal The Sage of Science (New York: Oxford University Press, 2005), 442
Buckminster Fuller: The combination of scientist and architect?

Buckminster Fuller was an American architect born in 1895. Fuller had a very unusual career path. He was very headstrong in his younger days and was dismissed from Harvard twice and never achieved a degree. After his first parting with the education system, he was sent by his family to work at a cotton mill as an apprentice machinist. This is where Bucky got his first hands-on knowledge of how things work. After a stint in a meat-packing house, he became a Naval officer during World War I. This allowed him to use the mechanical skills he had picked up as an apprentice in the mill. He was also assigned to a ship that dealt with wireless communications and aircraft, which involved a lot of advanced technology. During his time on this ship, Bucky invented a boom that was able to rotate around and lift crashed aircraft out of the water. While in the Navy, he married the daughter of an architect. With his new father-in-law’s patent for making fiber-concrete building blocks, he set his Stockade Building System.

The demise of his company allowed Bucky to seriously rethink the role that he, and all of us, play in the world. He began an intensive record of everything he had done in his life in 1907. He called it “The Chronofile” and it included a lot about technology which combined with his knowledge from the Navy of telecommunications allowed him to create his analysis of the “shrinking of our planet.” This document shows a graph of the speed of communication around the world. It also has a table on top showing how the planet from 500,000 BC to 1965 is shrinking because of the increased speeds in transport.

1 J. Baldwin, Bucky Works, (New York: John Wiley and Sons, 1996), 2
2 J. Baldwin, Bucky Works, (New York: John Wiley and Sons, 1996), 4
Bucky had a new way of looking at the world. The world as a whole, he had a vision of everyone sharing the world’s resources. In 1961, Fuller made a proposal to the International Union of Architects at their VIIth Congress to encourage architecture schools around the world to commit the next ten years to addressing how to make the world’s total resources, which then served only 40 per cent of the world’s population, serve 100 per cent of humanity. He also developed his dymaxion map, which is a flat map minus the distortion usually created by mapping the world in two dimensions instead of three. It shows the continents in a closer relationship than what we’re used to seeing. The sea’s are broken up and look like one continuous body of water surrounding the continents. It represents a similar idea to the graphs and tables of the distances between the continents getting shorter. He was one of the few architects of the time thinking on a global scale, and even more unusual thinking in terms of technology. The chronofile is full of sketches, clippings and statistics and trends. Analysis of this information meant he never repeated what had gone before, that he could always focus on a new technology that could be quickly and cheaply produced and that catered to the masses more so than one off projects usually created by architects.

Bucky looked for several things in a design, material efficiency, minimum surface geometry and the idea of a building as a valve that controlled the flow of energy from inside to outside. When it came to material efficiency in his buildings his hands on experience with the ships in the Navy, and even some sailing in his younger days, led him into using a building method very similar to that of a boat. In one of his earliest models we can see a central mast where a secondary structure is supported off it using cables in tension. He made this model in a similar way to the previously mentioned scientists. Modelling became the experiment, the performative model that became his way of testing a structure that would later become part of his Dymaxion House. In this model there was a clear representation of a new structural system. A system, or principle, that would become known as tensegrity.

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1 Buckminster Fuller, Phase I (1965) Document 3, Comprehensive Thinking, (Illinois, World Resources Inventory, 1965)
2 J.Baldwin, Bucky Works, (New York: John Wiley and Sons, 1996), 9
Fuller had a lifelong obsession with the relationship between tension and compression and his study of these forces became one of his most celebrated pieces of work. He defines tensegrity in his book *Synergetics*:

> “The word tensegrity is an invention: it is a contraction of tensional integrity. Tensegrity describes a structural-relationship principle in which structural shape is guaranteed by the finitely closed, comprehensively continuous, tensional behaviours of the system and not by the discontinuous and exclusively local compressional member behaviours. Tensegrity provides the ability to yield increasingly without ultimately breaking or coming asunder.”

Tensegrity structures are often described as having compression members floating in a sea of tension, where he has completely isolated the two forces within one structure and uses specific materials that deal purely with that force, which was one of the ways he implemented material efficiency. His book is far more a work of science and mathematics than it is of architecture, and is truly remarkable to have been written by an architect. The breadth of his scientific vision at times is incredible when reminded that he has no degree to his name. In the book he redefines many words and creates his own scientific language. The book is also full of diagrams, photographs and even mathematical formulae. It deals with everything from the Universe, to different types of structures, to the mathematical equations needed to create the geodesic domes.

With such detail in research and analysis, his creation of a new structural principle, he could almost be forgiven for not creating any real architecture. And yet he has. He has created his Dymaxion house, Dymaxion car and of course his geodesic domes. Bucky created his Dymaxion house in 1928. It was a revolutionary house for that era and originally packed full of technology that aimed to reduce running costs and save on energy. His houses were also designed to be mass produced, highly designed in such a way that could only be installed in one way and did not need any construction drawings to help build them. Everything about his Dymaxion house went against public taste, the hexagonal shape was highly unusual, coupled with the fact he wanted to make it out of sheets of aluminium made it even more so. But Bucky was not entirely interested in public opinion and believed in his design and the way he built them. For him aluminium was the right choice because of its longevity, lack of maintenance and it’s recyclability. The room with the most technology in it was his Dymaxion bathroom. There was a serious effort to reduce water consumption. There was a dry packaging toilet that uses no water and where the packages are used for compost and the production of methane. The second water saving technology was the revolutionised shower also known as the “Fog guns”. The shower used a combination of compressed air and a small amount of finely atomised water. The shower is said to use only one cup of water each time it is used. Unfortunately there was too much technology at one time for the general public to come to terms with and the Dymaxion house never became a success.

Buckminster Fullers contributions to not only the field of architecture but to humanity is inspirational. He has left behind a legacy in the form of a truly original lens through which an architect can look at the world and get a new perspective on where there place is in within it. These ideas have the possibility to far out last any buildings he could have or has ever designed. They speak to more than just the architect, they speak to the mathematician, the philanthropist, the geologist, the engineer, the housewife, and many more. Much like Einstein he passionately pursued something new, something he, for the most part, alone truly believed in. He challenged what was comfortable, what was normal in architecture. His ideas appear radical today and so must have been completely alien to people in the 1930s and 40s. The direction he took architecture for me is a positive one. He looked further than the more representative way of working traditionally associated with architects. While he may have missed out on some aesthetic or craftsmanship, his creations present the possibility of an architect to think on a global scale. It illustrates how extensive the footprint of architects is on the planet. The carbon emissions they create during the building process, the ability to affect the the culture and as such the micro economy of a place, to create social inequality and alter how people live and work. To address these issues requires a vision unhindered by romanticism or history. As a result of phenomena like climate change we know the current trajectory of living is no longer sustainable and will affect vast groups of people living in low lying areas. Fuller assumed responsibility for problems in the world that contemporary architects have never done. I agree an appreciation and positivity can be taken from what has gone before, but to use it as a way of addressing the problems of the future, whether we realise we are doing so or not, is already putting us several steps behind.

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Maybe now is a time for a more open dialogue between different disciplines, so that the architect is more educated and we can avoid the more literal translations that have crept into architecture over the years. In the case of Jean Renaudie, the translation of images of organisms under the microscope to his plan for the city of Le Vaudreuil. In recent times it has become the translation of the scientific diagram of air circulation patterns into sections of buildings. While these drawings represent the beginnings of scientific thought amongst architects I feel there is much more that the field of architecture can produce in terms of a wider vision for the future. Some inspiration can be taken from the work of Watson, Crick and especially Bernal. The unrestrained experimental way of working achieved by these scientists can only achieve a new direction for the field of architecture and the built environment.

Bibliography:

The Making
The Experimental Model

I began the project by trying to use the scientific mode of working which I had written about, through experimental models. In terms of thinking about energy and efficiency in architecture, I began experimenting with frames. I began testing a lightweight frame which could support something heavy to try and generate material efficiency when it comes to the dead and live loads applied to buildings. I made a series of models where I changed the materials of the frame and the weights suspended within this frame.
After these models I began to look at how this lightweight frame was supported. How would it’s base would change in relation to the ground type.

**Ground Conditions.**
After these set of models I wanted to experiment with real conditions with a real site. The site I chose was in Mayo and encompassed four different ground conditions. The part of the site I chose to build on was the sandy ground by the river. The proximity to the river meant the water table was quite high in this part of ground.

1. Arrive on site.
2. Dig four holes.
3. Place in uprights at angles.
4. Fill in the holes.
5. Attach bottom tensioning ring.
Once I had this one unit designed I began to try and design the overall building by making this unit work as a component of a overall floor. The unit in itself was unstable and so I had to design some bracing mechanism to stabilise the overall structure. Once the floor and supports were stabilised I was able to add the facade and roof.
I began to place these units on my site in Mayo and develop a relationship between them and the landscape. My programme became an agricultural school that mostly contained labs that worked on experimental ways of increasing the production of the land they were placed on. I worked on natural ways of heating and cooling the building.
The construction of the floor plate changes with the change of function inside the building. The floor plates of the labs are made of metal trays that hold water that tie into the hydroponic system used to create green living walls within the building that act as an acoustic barrier and air purifier. The more social spaces of the school have a timber construction that contains sand. Both the sand and water are used to weigh down the hollow floor construction after it arrives on site. Both materials are readily available on site. The floor plates are weighted to prevent uplift that is created through the gap between the ground and the floor plate. This gap is used to naturally ventilate the building through the floor. Air that passes underneath the floor gets drawn up through the centre of the columns and out the top.
The way we work as architects tends toward the representational more so than the performative. How can we learn from the field of science in terms of working through a problem. Using models to test the physical aspect of buildings. How to use physical modelling to test things like material efficiency. I began testing a lightweight frame that could support something heavy.

Science versus Lateral Design

The Model

How scientists use modelling to work through a problem.

A similar method was used by Buckminster Fuller.

FROM SCIENCE TO ARCHITECTURE

Problem:

1. 50 long section

The site I chose is a site in Mayo. Within the 200 square metre site the ground condition changes four times. To the North end of the site is the clydagh river, its banks are sandy which combine with the soil in the field beside it. Travelling further south the sandy soil becomes wet bog. As a result of both the river and boggy ground the water table is quite high throughout the site. Finally to the very south end the ground rock breaks the surface and becomes exposed.

What supports the frame?

How can we reassess building foundations?

Test Foundations

FROM SCIENCE TO ARCHITECTURE

Problem:

1. Arrive on site.
2. Dig four holes.
3. Place in uprights at angles.
4. Fill in the holes.
5. Attach bottom tensioning ring.

How can we use the conditions on site to create a new building type including foundations.

Problem:

The Architecture Project

1:200 Plan

How do we inhabit this new structure as a building on site? On a larger scale how is it braced?